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HUMAN REMAINS FROM THE TRENTON GRAVELS.

DR. FRANK RUSSELL.

IN the long controversy regarding the age of the implements or "paleoliths" from the Trenton gravels little attention has been given to the human remains from the same beds. Believing that some account of them would prove to be of general interest, I have undertaken¹ their study in the attempt to determine whether or not they resemble the remains of recent Indians of that region. As the Delaware Valley was occupied by the Lenni Lenapé until 1737, the crania found near the surface, at least about Trenton, are, presumably, of members of that tribe.

Material. — The most interesting of these relics is an imperfect calvarium (Fig. 1) found at a depth of twelve feet from the surface in the stratified gravels. It was discovered by a laborer who was leveling the bottom of the pit which had been dug for the gasometer of the Trenton Gas Company. The workman's spade cut away a large portion of the left parietal, which was not recovered. The skull was taken by the foreman in charge of the excavation to a druggist, who displayed it in the window of his store, where it was seen by Dr. Abbott and obtained by him for the Peabody Museum at Cambridge. Both the foreman and the druggist are now dead, so that no statement can be obtained of the circumstances, though diligent inquiries were made at the time by Dr. Abbott. As no one received any compensation for the skull, there was no evident motive for deception. This skull, together with all the specimens described in this paper, is now in the possession of the Peabody Museum of Harvard University. In the report of the curator of the museum, F. W. Putnam, for 1879, we find this statement: "The

¹ With the kind permission of Prof. F. W. Putnam. I have also to thank Dr. C. C. Abbott and Mr. Ernest Volk for information about the position of the specimens.

two human crania received from Dr. Abbott are of particular interest; one probably being the skull of a Shawnee Indian, while the other, which is of entirely different shape, small, long, and very thick, was found in the gravel under such circumstances as to lead to a belief in its very great antiquity."

The calvarium (Fig. 2) from Burlington County, New Jersey, was found by Michael Newbold in 1879, while plowing a field



FIG. 1.

where the "gravel came to the surface." It would have been classed as that of a recent Indian had it not been found in the gravel, not accompanied by the remainder of the skeleton, and had it not resembled the Trenton skull in being low vaulted.

Another calvarium (Fig. 3), exhibited with the two preceding and usually regarded at the Peabody Museum as of the same type, was found in Riverview Cemetery at Trenton in 1887. The workman who found it states that the skull was lying two and one-half to three feet from the surface in clear greenish sand. "The place where it was found is on a knoll, one of the highest

points in the cemetery. No other bones were found with it. There were a few black lines near the skull; they may have been caused by the decayed roots of trees, or bones. No trace of black soil was noticed with the sand. Numerous Indian relics were noticed in the top soil.”¹

Three fragments have been found by Dr. Abbott himself, in the cuts made by the railway in the stratified gravels at Trenton. One of these is a left temporal bone (Fig. 4), the petrous portion of which is broken; and its whole appearance



FIG. 2.

strongly corroborates the statement of the finder, that it was taken from the undisturbed glacial gravels at a depth of thirteen feet.

A portion of the left ramus of a human jaw (Fig. 5) was found by Dr. Abbott at the same locality in 1884. It was lying at a depth of sixteen feet from the surface and appears to have been subjected to rough usage by the gravels. The jaw is that of an individual, having a prominent chin, and exhibits neither primitive nor simian characters.

¹ Statement made recently to Mr. Volk and communicated in a letter dated Dec. 7, 1898.

Still another specimen found by Dr. Abbott at this place is a human tooth, a third molar, an account of which was given in a paper read by him before the Boston Society of Natural History in October, 1882.¹

In the attempt to identify the single skull, or, assuming that the Burlington and Riverview specimens are also ancient, the three skulls from Trenton, we must necessarily proceed by the

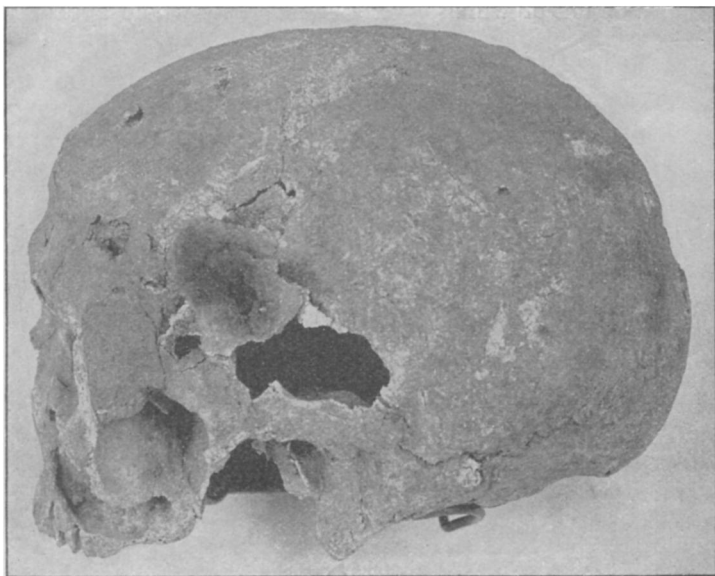


FIG. 3.

comparative method. A number of Indian skeletons have been discovered by Mr. Volk during his excavations upon the Lalor Farm at Trenton, but these specimens are "in boxes and not accessible." The only crania from that region available for comparison with the Trenton skulls are one from West Chester, Penn., in the Delaware Valley, and one from a Delaware peat bog.

I have also included in the table of measurements the averages of a series of five from the stone graves of Tennessee, selected from a large number as being nearly if not quite free

¹ *Proceedings Boston Society of Natural History*, vol. xxii, p. 96.

from artificial deformation. To the northward of the region in question but two crania are available, and these from Central New York, probably those of Indians belonging to the Iro-

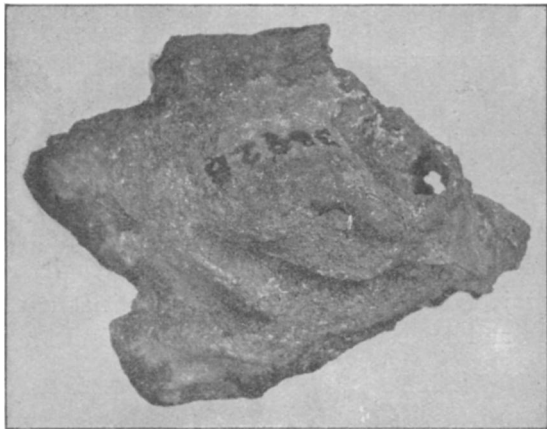


FIG. 4.

quoian stock. From the east a series of Massachusetts crania is taken. For additional comparison a series of skulls from Santa Cruz Island, off the coast of California, is introduced; these have the same cranial index as the average of the three

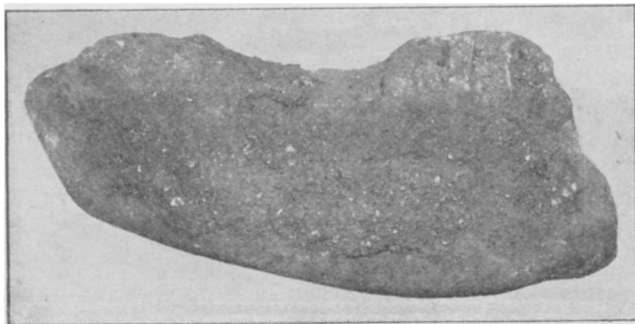


FIG. 5.

from New Jersey. Accounts of most of these have been published by Mr. Lucien Carr, the accuracy of whose measurements is unquestioned; yet I have re-measured all because of some differences in methods of procedure, and in order to eliminate,

as far as possible, the probability of error arising from the personal equation in general.

Discussion of the Measurements. — A general similarity will be noted in the absolute dimensions of the individual crania, except in the case of the male calvarium from Delaware, which is somewhat larger than the others. The condition of the three New Jersey specimens is such that the capacity cannot be gauged by the usual methods. However, the Trenton skull, the smallest, is neither so short, so narrow, nor so low as two adult crania in the Massachusetts series. In all transverse diameters the Trenton skull closely resembles the modern skull from West Chester (Fig. 6), while in the sagittal diameters and the projections from the auricular axis it stands nearer the Burlington and Riverview skulls. The marked brachycephaly



FIG. 6.

of the Burlington skull (Fig. 7) is rare among Algonquian crania, and upon the evidence of this character alone the investigator is inclined to exclude it from further comparison with the Trenton

skull. The Riverview skull (Fig. 8) has an open metopic suture and is both lower and broader than the Trenton specimen.¹

An exhaustive comparison of the absolute measurements would lead to nothing; the indices are more suggestive. The

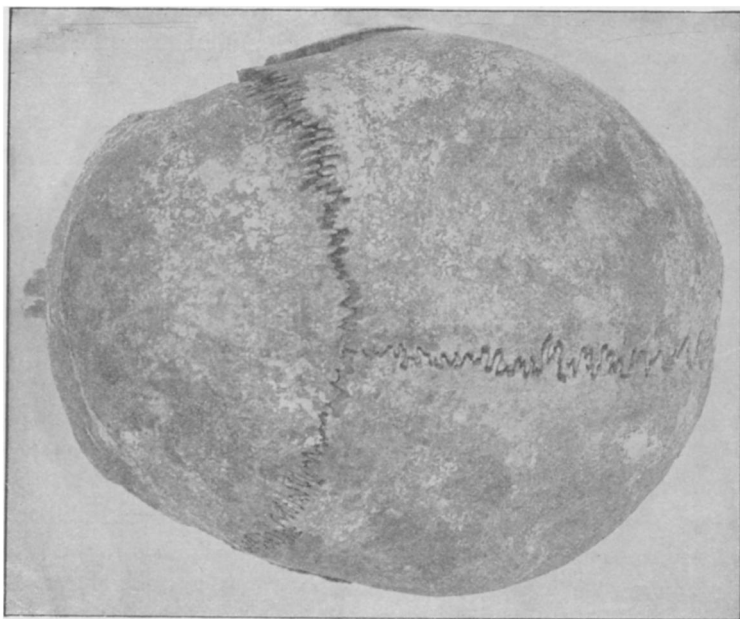


FIG. 7.

cranial index is, of course, the most important of these. In this respect the Trenton skull (Fig. 9) stands near the mean of the whole numbers represented in the table of measurements. The average cranial index of four female crania from Maryland,² described by Cope, is 75.1. These crania "are inferably those of Nanticokes,"³ closely related, of course, to the Lenni Lenapé of the Delaware Valley. The index of the Trenton skull, 77.8, is well within the limits of mesaticephaly and is about the aver-

¹ Harrison Allen has described a Lenni Lenapé metopic cranium having a cranial index of 75, vertical 76, orbital 92, and nasal 53, *Crania from the Mounds of Florida* (p. 408).

² Cope, E. D. *Physical Characters of the Skeletons found in the Indian Ossuary on the Choptank Estuary, Maryland* (p. 99).

³ Mercer, H. C. *Exploration of an Indian Ossuary on the Choptank River, Dorchester County, Maryland* (p. 98).

age of Algonquian female crania; the broken parietal gives it a deceptive appearance of narrowness. Its vertical index (72.5) resembles that of the West Chester skull, and is widely removed from those of the Burlington and Riverview specimens. The relative height is not notably less than that of the Massachusetts series, in which the range of this index is from 67.8 to 8.5. The superior facial index could not be calculated in many cases because of the broken condition of the crania. The naso-malar index, which expresses the degree of projection of the interorbital region, is quite uniform and within the limits of individual variation for the whole series. The racial averages given by Thomas¹ are :

9 Mongols	105.9, range	105.1 to 106.9
5 Andannanese	107.5 " "	105.5 " 108.6
25 West African Negroes . . .	108.5 " "	106.1 " 113.3
16 Caucasians	111.1 " "	109.1 " 114.2

Sex not stated.

ADDITIONAL EXAMPLES OF AMERICAN CRANIA.

10 ♀ Massachusetts Indians . .	108.6, range	105.6 to 111.2
16 ♀ Santa Cruz Island Indians	107.4 " "	101.1 " 111.4
5 ♀ Tennessee Indians . . .	108.4 " "	106.3 " 110.2
15 ♀ Labrador Eskimos . . .	105.8 " "	104.1 " 108.2

The orbital index is higher in the Trenton skull than in the Eastern Algonquins, in only one of which is the index above 90. In the shape of the orbit the New Jersey and West Chester skulls stand apart from the others and fall within the megaseme group. Unfortunately, the nasal index cannot be calculated for the Trenton skull; the West Chester and Riverview crania both have lower nasal indices than the skulls from the region north and west of them. The evidence of the remaining indices is inconclusive and comment is unnecessary.

Condition of the New Jersey Crania.—The sutures of the Trenton skull are obliterated, and its thickness is sufficient to insure its preservation where an ordinary skull would be crushed to fragments. However, it does not present the appearance of having been rolled about for any length of time in the gravels; the left styloid process projects for a distance

¹Oldfield, Thomas. *Journ. Anth. Inst.*, vol. xiv, p. 333.

of 10 millimeters (Fig. 1), and the surface of the brain-case is almost without a scratch. The lower portion of the face has been broken away in a manner similar to that seen in many skulls from recent graves, and not directly through the stronger parts of the bone, as in the case of the Calaveras skull. The worn appearance of the margins of the orbits and the portions that remain of the zygomatic arches may be ascribed to the

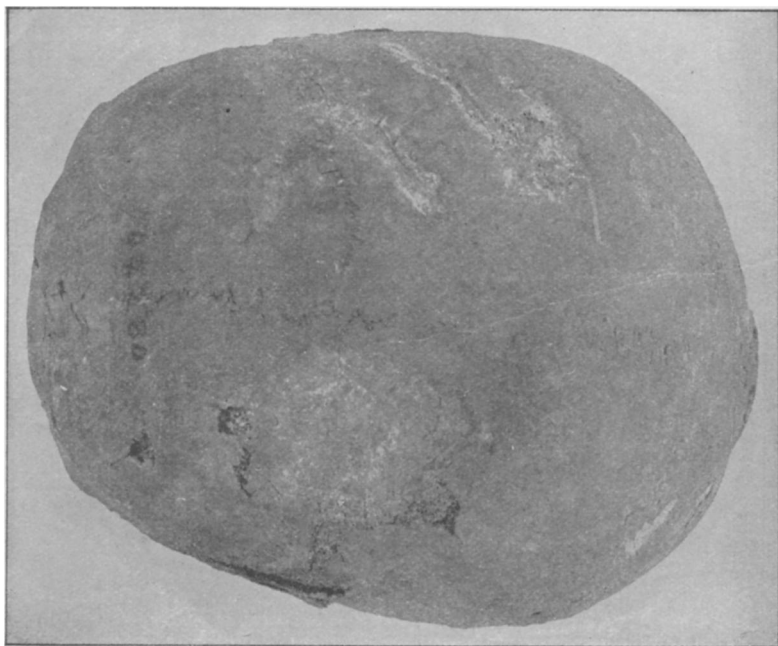


FIG. 8.

vicissitudes of a brief journey in the waters of the Delaware River or Assunpink Creek. Though the surface of the ground where the skull was found is twenty feet above the ordinary level of the Delaware, the locality has been overflowed in recent years, so that existing agencies could have swept skull and gravels into place and buried them beneath succeeding strata of sand and gravels and huge ice-raftered boulders. The length of time that has elapsed since the skull was deposited in the gravels is probably very great, though of course it is not geologically ancient. The presence of the fragments of crania

in the gravel pits along the railway may be accounted for by the same hypothesis advanced by Dr. Abbott to explain the position of the rude implements in that locality. The railroad cutting passes through an old channel of Assunpink Creek, and Dr. Abbott states that "it was *always* along the old creek bed that the chipped argillites were found, along the railroad excavations east of the site of the gas works where the skull was found; and when the excavations continued *beyond the*

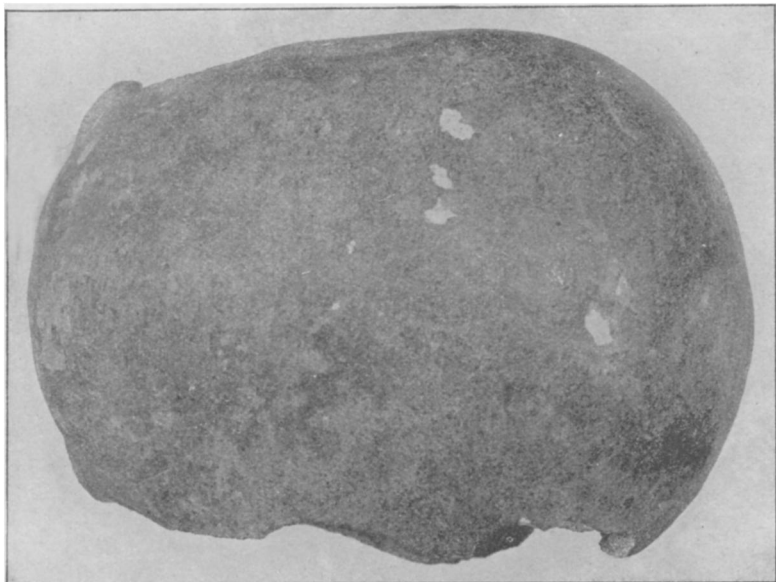


FIG. 9.

area of the immediate creek valley they disappeared."¹ The thickness of the Trenton skull is not rare in American crania. The Delaware skull, No. 48,974, furnishes an example close at hand of an even greater thickness.

The Burlington and Riverview skulls are thin and fragile, and their sutures are open (Figs. 7, 8). They are unworn and present no evidence of ever having been moved by flowing water, torrential or otherwise. They do not closely resemble the Trenton skull, though the morphological differences are

¹ In a letter to the writer, December, 1898.

well within the limits of variation of a tribal group. The three skulls are distinguished from those from the regions to the north, east, and west, and are related to the skull from West Chester by their orbital and nasal indices and minor characters.

Conclusion. — From the evidence supplied by the Trenton skulls themselves the conclusion is inevitable that they are of modern Indians, probably of the Lenni Lenapé.

TABLE OF MEASUREMENTS IN MILLIMETERS.

LOCALITY	BRIAR HILL, ST. LAWRENCE Co., N. Y.	WEST CHESTER, PENN.	CAYUGA Co., N. Y.	PEAT BOG, DEL.	TRENTON, N. J.	BURLING- TON Co., N. J.	RIVERVIEW CEMETERY, TRENTON, N. J.	AVERAGES.		
								ELEVEN FROM SANTA CRUZ ISLAND, CAL.	SIXTEEN FROM MASSA- CHUSETTS.	FIVE FROM STONE GRAVES, TENN.
Catalogue No.	14114	19512	38964	48974	14635	19513	44280	—	—	—
Sex	♀	♀	♀	♂	♀	♀	♀	♀	♀	♀
1. Length, glabello-occipital	180	180	174	193	171	176	185	174.1	178.1	169
2. Breadth	134	130	135	142	133	147	146	136.9	134.5	130.8
3. Minimum frontal breadth	95	93	87	98	94	94	96	89.7	90.9	90
4. Bi-asterial breadth	105	105?	91	119	—	—	—	107.7	106.8	99.5
5. Bi-auricular breadth	118	113	111	123	115	112	118	—	—	—
6. Bi-zygomatic breadth	—	—	124	140	—	123	—	128	127.4	—
7. Naso-malar breadth	107	108	101	115	104	103	105	104.5	102.6	105
8. Bi-malar breadth	99	98	92	108	96?	93	98	96.2	95.5	96.8
9. Bi-maxillary breadth	97	97	91	103	—	92?	93?	94	92.8	93.3
10. Bi-alveolar breadth	61	67	—	70	—	—	57?	63	63.4	65
11. Maxillary length	55	55	57	55	—	—	51	53.8	53.3	54
12. Basi-alveolar length	96	105	103	105	—	—	80	100.8	95.3	97.6
13. Basi-nasal length	93	101	104	105	93	95	84	101.6	92.6	99
14. Basi-bregmatic length	125	132	134	137	124	119	118	123.8	134.5	134.4
15. Basion-obelion	122	130	125	138	124	118	122	121.2	129	126.2
16. Basion-lambda	116	121	115	125	111	111	120	112.4	118.3	112.6
17. Basion-opisthion	—	—	35	42	33	37	37	34.2	34.9	32.3
18. Breadth of foramen magnum	—	—	30	32	26	28?	32	29.3	31.3	28
19. Orbital breadth	41	40L	37	42	37	37	36	38.7	39.2	39.2

20. Orbital height	33	37	32	35	35 ²	36	33	33.8	36.8	34.4
21. Orbital depth	51	51	51	52	50 ²	48?	50?	48.1	49.7	49
22. Inter-orbital breadth, bi-dacryc	20	23	20	24	24	20	25	20.2	19.3	21.5
23. Nasal height	51	52	50	44	—	—	51	46.4	51	49.4
24. Nasal breadth	26	24	27	30	—	—	25	22.4	25.8	26
25. Palatine length	51	54	54	55	—	—	47	45.9	47.1	48.5
26. Palatine breadth, anterior	22	24	—	27	—	—	23	24.8	25.8	26.8
27. " " posterior	38	43	—	46	—	—	—	40.4	41.6	42.2
28. Naso-alveolar length . . .	73	72	72	63	—	—	69	63.8	68.3	67.8
29. Maximum circumference	506	498	409	550	504?	514	535	495.2	498.4	481.6
30. Supra-occipital arc . . .	400	392?	384	432	353	386	400	388.7	398	380
31. Supra-auricular arc . . .	293?	298	299	312	284?	300	298	282.4	288	292.2
32. Ear toinion	78	—	75	88	83	73	82	—	—	—
33. Ear to vertex	108	117	114	122	107	105	105	—	—	—
34. Ear to glabella	93	94	97	99	85	92	87	—	—	—
35. Ear to orbit	65	67	69	70	60	62	58	—	—	—
36. Facial angle	80°	80°	83°	84°	—	—	84°	78.5	81.9	82°
37. Thickness	—	—	—	8-11	8-10	—	—	—	—	—
<i>Indices.</i>										
38. Cranial	74.4	72.2	77.6	73.6	77.8	83.5	78.9	78.7	74.8	77.4
39. Vertical	69.4	73.3	77	71	72.5	67.6	63.8	71.1	75.9	79.5
40. Superior facial, Broca . .	—	—	58	45	—	—	—	50.3	—	—
41. Naso-malar	108.1	110.2	109.8	106.5	108.3	110.8	107.1	107.4	108.6	108.4
42. Orbital	80.5	92.5	86.5	83.3	94.6	97.3	91.7	87.7	86.3	87.7
43. Nasal	51	46	54	68.2	—	—	49	48.3	50.6	52.7
44. Maxillary	110.9	121.8	—	127.2	—	—	111.7	119.4	118.6	120.5
45. Palatine	7+5	79.6	—	83.6	—	—	—	88	88.1	87.5
46. Foramen magnum	—	—	85.7	76.2	78.8	75.7	86.5	85.7	86	85.1